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ABSTRACT

The computer revolution was expected to help American schools to teach traditionally unsuccessful students more effectively and to reduce educational inequalities. Research suggests, however, that computer technology has in many ways actually widened the gap in educational opportunity. Nevertheless, this report finds that computers and collaborative learning environments can be used effectively to develop language and literacy skills in students who have difficulty with traditional teaching methods. Inequities in school computer use result from some of the following factors: (1) unequal access to computers in the home; (2) limited access in ethnic and language minority schools; (3) reductionist teaching approaches; and (4) limited access and applicability for female students. Research indicates dramatic linguistic and academic improvement when students are given access to problem solving, word processing, and communications software, especially for use in collaborative tasks. The coupling of the process approach and computer use in group writing instruction encourages purposeful social interaction in the classroom and engenders both spoken and written language enrichment. The integration of computers into the language arts curriculum involves female students in technological literacy. Electronic mail has also developed as an important tool in literacy development. Emphasis is placed on the role of skilled teachers in engaging all students through computers. A list of 12 references is appended. (AF)

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COMPUTERS AND OPPORTUNITIES FOR LITERACY DEVELOPMENT
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by Jo Anne Kleifgen

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COMPUTERS AND OPPORTUNITIES FOR LITERACY DEVELOPMENT

When the computer revolution began in American schools, hope ran high that this new tool would help to solve many educational problems, including the problem of how to teach traditionally unsuccessful students more effectively. Research in the 1980s suggests, however, that the introduction of computer technology into the schools has served to widen the gap in educational opportunity between rich and poor, male and female, and Anglo-American and other ethnolinguistic populations. This report examines briefly that situation. It also explores ways in which some schools have begun to use computers and collaborative learning environments to help develop language and literacy skills in students who have difficulty with traditional teaching methods.

Inequities in School Computer Use

In the early part of this decade a national survey (Center for the Social Organization of Schools , 1983-84) of over one thousand schools revealed that lower income students have less access to computers than do middle and upper income students. This finding was not surprising, since affluent parents and school systems are better able to invest in such costly equipment.

Further, non-white and limited English speaking students frequently go without computers in their schools. Those few who do get access to computers are generally given drill and practice exercises rather than problem-solving or other more challenging software. This trend may be the result of an erroneous belief in reductionist, or part-to-whole learning, which calls for poor readers to first master the rules for phonics, then learn single words, and only later, be given sentences and stories to decode. Studies suggest, however, that learning can be more effective through gradual differentiation of the whole into meaningful units (Vygotsky, 1987; Cole, Griffin & Laboratory of Comparative Human Cognition, 1987).

The CSOS survey also found that female students, regardless of social class, spend less time in school on computers than males. An important reason for this is related to the type of tasks assigned. Computers are generally set aside for math and science education or programming rather than for instruction in the language arts, where female students traditionally have excelled (Hawkins, 1985). By extending computer applications in schools to the development of language and literacy skills, more female students can be attracted to the technology.

Using Computers for Language Development

Students improve linguistically and academically when given access to problem solving, word processing, and communications software, particularly when such software is used in collaborative tasks. Problem solving at the computer, for instance, encourages cognitive and linguistic development. Students discuss and clarify assigned tasks and resolve contrasting points of view (Mehan, Moll, & Riel, 1985). Group work engenders increased and richer language use during a learning task.

Diaz (1984) demonstrated that Spanish-dominant students made strong gains in English as a result of involvement in complex computer tasks. The students learned to use computers during after-school enhancement lessons in programming, text processing, and electronic mail. Although the materials were in English, the bilingual teachers encouraged the use of Spanish as a bridge to learning skills and concepts. Having gained special knowledge about computer operations, the students later became peer teachers in their regular, English-medium classrooms, and, as a result, their academic performance and self-esteem improved along with their English proficiency.

It should be noted that the choice of software clearly influences the quality of human interaction in computer-shared settings. Clements and Nastasi (1988), for example, found that LOGO environments, when compared to drill-and-practice environments, encouraged a greater frequency of social problem-solving.

Using Computers to Develop Literacy Skills

Specialists in the teaching of writing have been able to demonstrate the positive effects of the process approach, which places emphasis on choosing meaningful topics, writing in groups, and conferring together about drafts (Graves, 1983; Calkins, 1986). This process approach to writing, particularly when coupled with computer use, encourages purposeful social interaction in classrooms. One reason for this may be the nature of the hardware itself: because the screen content is visible to others, what was once considered a private activity becomes more public. Moreover, the ease with which students can revise on computers allows them to discuss and test alternatives, and edit one another's errors. Improvement in writing takes place once students have control over the word processing commands, and this improvement can occur for students who are learning English as well as for native speakers of English (Mehan et al., 1985).

Finally, writing together on a word processor engenders both spoken and written language, with each mode of communication enriching the other. Teachers and students talk about the text that they are drafting and revising. At the same time, the words and phrases displayed on the monitor are incorporated into their discussions (Kleifgen, 1989).

When computers are integrated into the language arts curricula of schools, female students have increased access to and interest in the technology. Traditionally high achievers in reading and writing, they become as involved in the technology as males when computers are used as tools for writing (Hawkins, 1985). Group writing at the computer, then, can become an entry point to technological literacy for female students.

One of the most exciting applications of computers for the development of literacy has been the use of electronic mail, either within a school through local area networks or through telephone links to other schools locally and around the world through inexpensive electronic bulletin boards. For example, students in San Diego draft and edit news articles for the *Computer Chronicles Newspaper* (Levin, Riel, Boruta, & Rowe, 1984). Then they send their articles via electronic mail to students in other states and even other countries, including Israel, Japan, and Mexico. Members of a student editorial board edit incoming stories for publication in the *Chronicles*. Having a newswire and a real audience gives the students a goal for writing and provides motivation for revising and editing. Similarly, a project called De Orilla a Orilla (From Shore to Shore) allow bilingual students in Connecticut, Puerto Rico, and Mexico to transmit stories and newsletters. The project has been successful in improving students' native language and and English literacy skills (Sayers, 1989).

The Crucial Role of Teachers

These projects demonstrate not only that computers help students to achieve academic success but also that the best improvements in language and literacy have occurred in the classrooms of skilled teachers. They make pedagogical choices that encourage productive classroom interaction and engagement in tasks that are both challenging and meaningful to all students. Rejecting the notion of a dual curriculum that provides cognitively challenging tasks for advanced students and rote learning for struggling students, effective teachers use computers as tools for learning, choose appropriate software, and take an active role in teaching children how to use them in a collaborative learning environment.

Conclusion

In sum, a constellation of factors is important in the development of language and literacy skills for all students:

- cognitively challenging software, including software for text construction and exchange;
- collaborative learning environments where spoken and written language is used to solve problems and complete meaningful tasks; and
- skilled teachers who provide challenging tasks for every student and become involved in using computers as tools for learning.

In effect, by providing rich linguistic environments and meaningful learning activities, teachers can use computers to enhance the educational experiences of all students, regardless of ethnicity, gender, or economic background.

—Jo Anne Kleifgen

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